PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
IN I 1124-MAJR		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/ZA2004/000080	13.07.2004	15.07.2003

International Patent Classification (IPC) or national classification and IPC

F42D1/055

Applicant

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1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in Item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
11.05.2005	10.10.2005

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/ZA2004/000080

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-9	as originally filed
Claims, Numbers	
1-14	received on 09.06.2005 with letter of 08.06.2005
Drawings, Sheets	
1/1	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☒ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☒ the claims, Nos. 15 17
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (SEPARATE SHEET)

International application No.

PCT/ZA2004/000080

Re Item V.

1 The following documents are referred to:
D1 : US 4 846 066 A (BEATTIE TIMOTHY A ET AL) 11 July 1989

2 INDEPENDENT CLAIMS 1, 6 and 10

2.1 The present application does meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 6 is new in the sense of Article 33(2) PCT.

D1 shows a method of programming a plurality of detonators (6) which are connected to a control unit (exploder 1) by a communication bus (bus wire 3), the method including the steps of using the control unit to address a first detonator to allow an exchange of data (col. 3, l. 26-33). on the communications bus, between the first detonator and the control unit and using the first detonator to enable a second detonator (col. 2, l. 45-53) to be addressed by the control unit to allow an exchange of data, on the communications bus, between the second detonator and the control unit (col. 2, l. 60-63). The data connection is a combined power data connection. An individual/direct addressing is not foreseen.

The subject matter of claim 1 differs from this known method in that the second detonator is addressable by the control unit only after a second enabling signal has been sent by the first detonator to the second detonator and wherein the second enabling signal is only sent once a first disabling signal has been sent by the control unit to the first detonator.

Also claim 6 recites this differing feature: "...disabling the first detonator from being addressed by the control unit, using the first detonator to enable a second detonator to be addressed by the control unit..."

Claim 10 recites that the detonators are individually addressable, which in combination to the daisy chain feature are the corresponding features to claims 1 and 6. Note that in D1 a certain detonator can only be dressed if all previous have been

addressed as well. Hence there is no "individual addressing" in the way as it this term is used in the present application (see paragraph 24).

The problem underlying the present invention is to provide versatile and safe method of programming the detonators.

The prior art does not teach the proposed solutions.

Hence the present invention fulfils the requirement of Art. 33(3) PCT.

The invention is industrially applicable (Art. 33(4) PCT).

CLAIMS

1. A method of programming a plurality of detonators which are connected to a control unit by a communications bus, the method including the steps of using the control unit to address a first detonator to allow an exchange of data, on the communications bus, between the first detonator and the control unit and using the first detonator to enable a second detonator to be addressed by the control unit to allow an exchange of data, on the communications bus, between the second detonator and the control unit, wherein the second detonator is addressable by the control unit only after a second enabling signal has been sent by the first detonator to the second detonator and wherein the second enabling signal is only sent once a first disabling signal has been sent by the control unit to the first detonator.

2. A method according to claim 1 wherein the second detonator is used to enable a third detonator to be addressed by the control unit to allow an exchange of data, on the communications bus, between the third detonator and the control unit.

3. A method according to claim 1 or 2 wherein the first detonator is addressable by the control unit only after a first enabling signal has been sent by the control unit to the first detonator.

4. A method according to any one of claims 1 to 3 wherein the first detonator is closest on the communications bus to the control unit.

5. A method according to any one of claims 1 to 4 wherein the first detonator is a predetermined one of the plurality of detonators and is directly addressable by the control unit.

6. A method of programming a plurality of detonators in sequence which includes the steps of exchanging data between a first detonator and a control unit using a communications bus to which all of the detonators are connected in parallel, disabling the first detonator from being addressed by the control unit, using the first detonator to enable a second detonator to be addressed by the control unit, exchanging data between the second detonator and the control unit using the communications bus, using the second detonator to enable a third detonator to be addressed by the control unit, and using the communications bus to disable the second detonator from being addressed by the control unit.

7. A method according to claim 6 wherein the first detonator is disabled by means of a first signal sent on the communications bus and, when the first detonator is disabled, the first detonator is used to enable the second detonator to be addressed by the control unit.

8. A method according to claim 6 or 7 wherein the first detonator is a predetermined one of the plurality of detonators and is directly addressable by the control unit.

9. A method according to claim 6 or 7 wherein the first detonator is closest on the communications bus to the control unit.

10. A blasting system which includes a control unit, a communications bus which is connected to the control unit, a plurality of detonators which are individually

addressable and which are connected in sequence to the communications bus along its length, and a daisy chain connection between the control unit and the detonators, and wherein, within the sequence of detonators, a first detonator makes use of the daisy chain connection to enable a second following detonator so that data can be exchanged between the control unit and the second detonator using the communications bus.

11. A blasting system according to claim 10 wherein the first detonator is disabled by a first signal on the communications bus, from being addressed by the control unit, and the first detonator then enables the second following detonator to be addressed by the control unit.

12. A blasting system according to claim 10 or 11 wherein data which is exchanged between each detonator and the control unit is selected from timing information which relates to the operation or initiation of the detonator; information on the status or an operation aspect of the detonator; testing information relating to the detonator; and detonator identity, address or category data.

13. A blasting system according to any one of claims 10 to 12 wherein the first detonator is a predetermined one of the plurality of detonators and is directly addressable by the control unit.

14. A blasting system according to any one of claims 10 to 13 wherein the first detonator is closest on the communications bus to the control unit.